A NOTE REGARDING THE REVISED ILLUSTRATION OF CYCLONE DEVELOPMENT SEQUENCE SHOWN IN "THE VARIABLE APPEARANCE OF THE EARTH FROM SATELLITES"

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Fritz [1] recently published a revision of a previous illustration which depicts the several stages of cyclone development from the open wave to the occluded decaying stage. Satellite photographs of different storms were used as examples of the various stages, since the opportunity to observe an individual incipient wave cyclone as it develops has been rare because of the limitations of TIROS coverage prior to the launch of TIROS IX. However, the example which Fritz has chosen for his figure 9b is one of those rare occurrences, when photographs of the same storm are available both 24 hr. earlier and later. This sequence of photographs (as pointed out

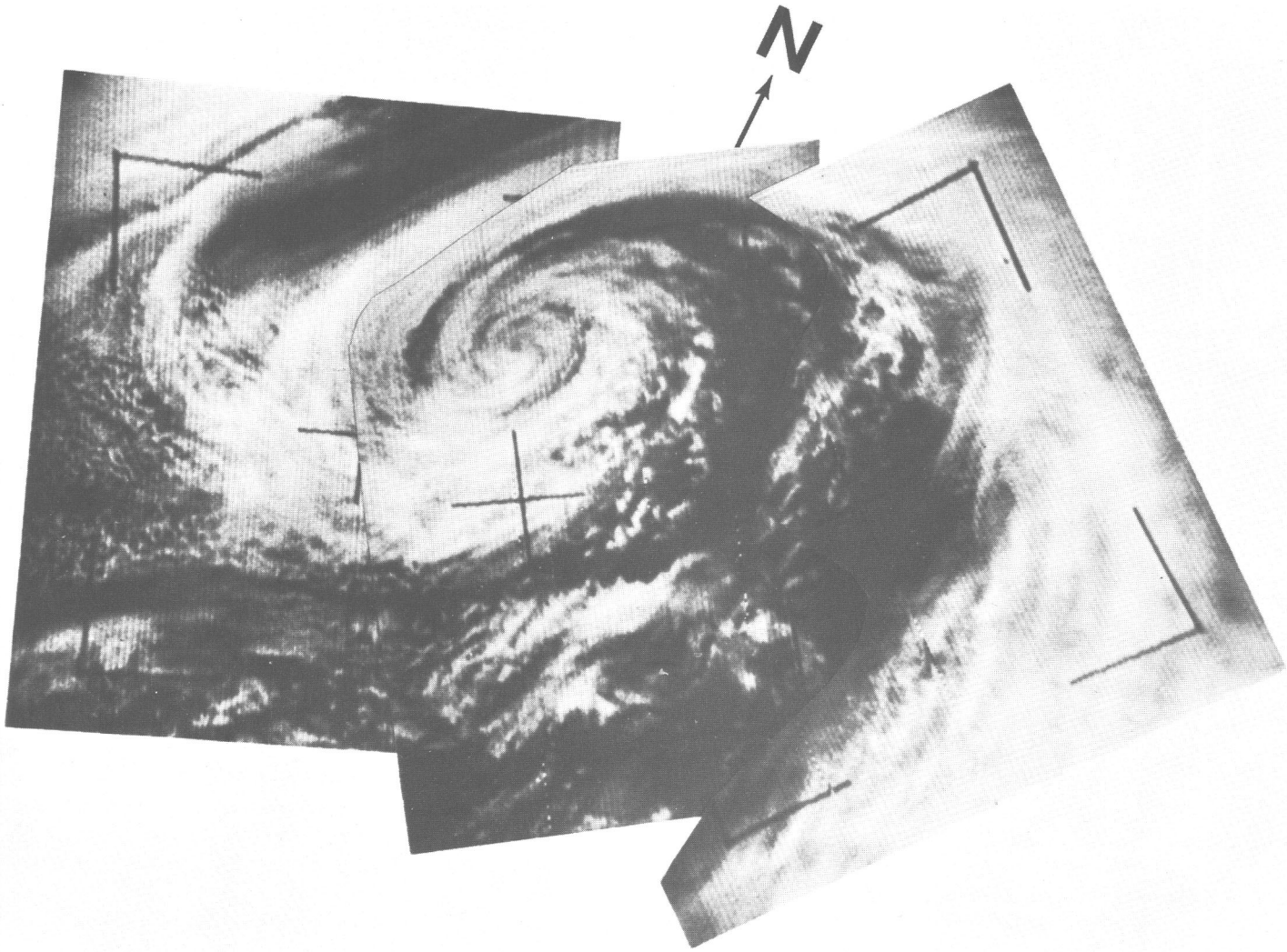

FIGURE 1.—Well developed cloud spiral (50° N., 152° W.) with cold frontal band extending southward along eastern edge of picture. TIROS IV, orbital pass 881, April 10, 1962.

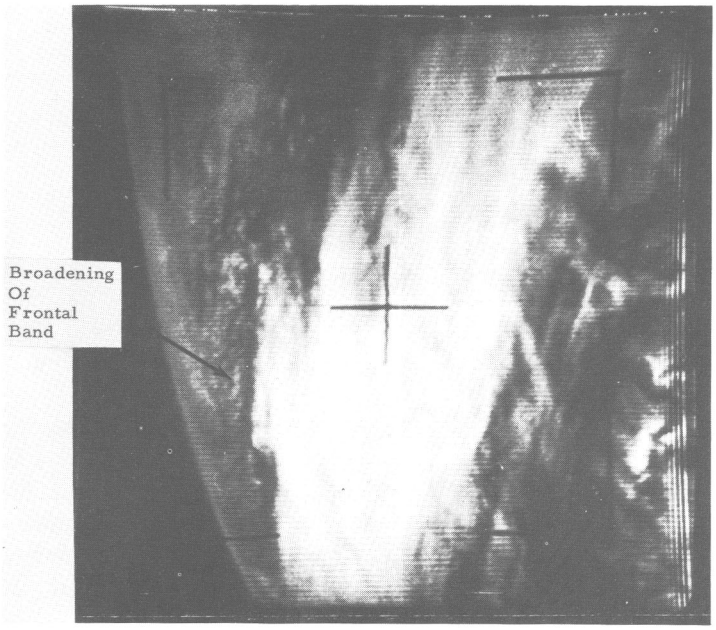

FIGURE 2.—Broadening of the frontal band associated with wave formation (37° N., 154° W.). TIROS IV, orbital pass 880, April 10, 1962.

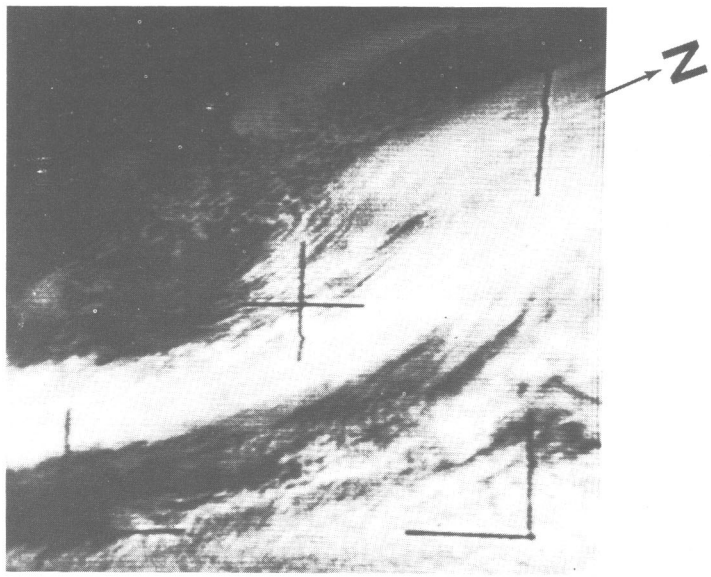

FIGURE 4.—Wave development just prior to occlusion, later stage of same storm as shown in figure 2. TIROS IV, orbital pass 894, April 11, 1962.

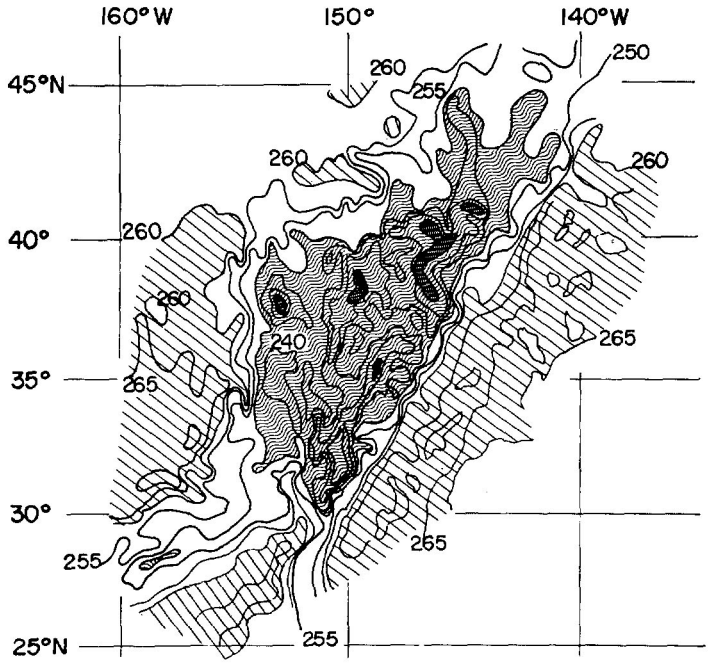

FIGURE 3.—Infrared radiation analysis for orbital pass 880 revealing the broadening of the frontal band.

by the authors in [2], and with concurrent infrared observations subsequently investigated by the authors [3] under U.S. Weather Bureau sponsorship) may be of interest to readers of the *Monthly Weather Review* and is briefly discussed below.

The wave cyclone formed on the frontal band associated with the well developed cloud spiral shown in figure 1. Figure 2 shows the broadening of the frontal cloud band as the wave formed (1957 GMT, April 10, 1962). Figure 3 is the Channel 2 (8–13 micron) infrared analysis for the area shown in figure 2, and identifies the location. The equivalent blackbody temperatures shown on the analysis can (after about a 5° K. correction has been added for sensor degradation) be related to cloud height through either the standard atmosphere or actual radiosonde data. Thus, areas of very low temperatures (lower than about 245° to 250° K.) are areas of middle or high clouds.

Figure 4 is the picture (1920 GMT, April 11, 1962) substituted by Fritz for his earlier example [4] and figure 5 is the corresponding infrared analysis. Note the similarity in shape between the cloud pattern and the infrared pattern. Figure 6 shows the western portion of the cloud pattern approximately 24 hr. later (2025 GMT, April 12, 1962). Although only a portion of the cloud spiral is visible in the picture, it is obviously in a well developed stage similar to the photograph in figure 9e of Fritz's sequence. Infrared data corresponding to figure 6 are not available.

The above series of pictures and supporting data clearly

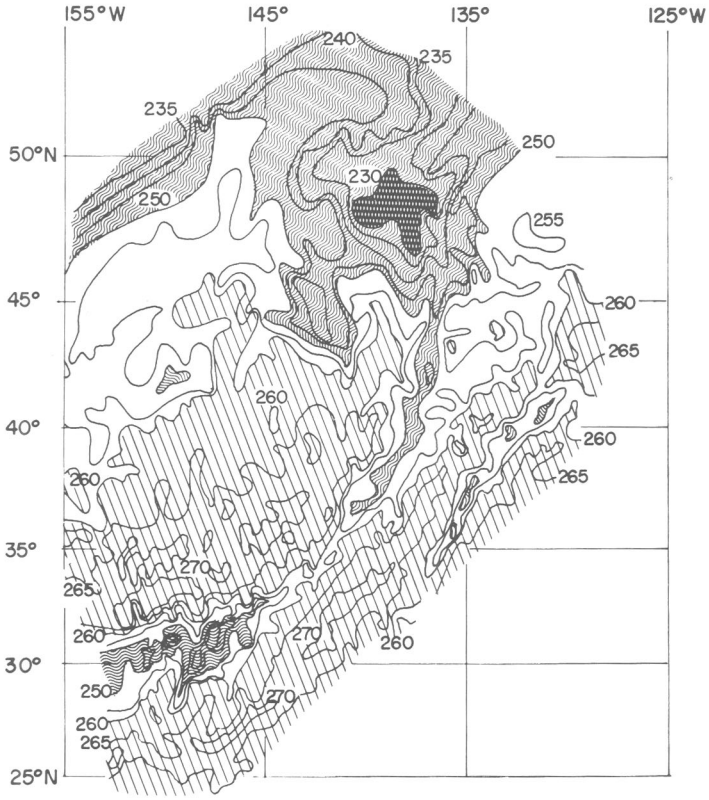

FIGURE 5.—Infrared radiation analysis for orbital pass 894.

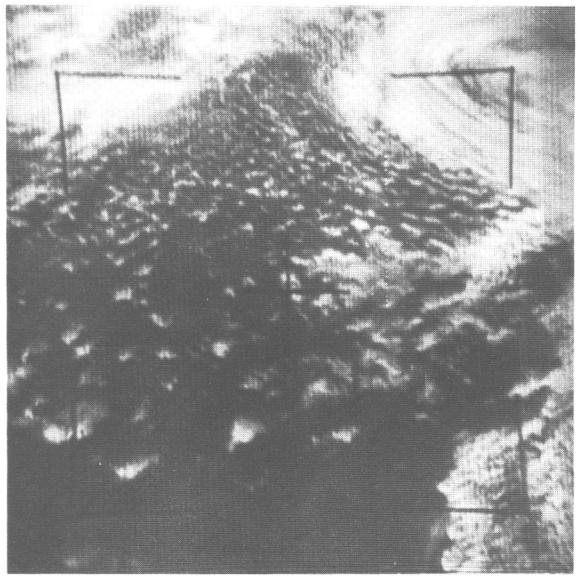

FIGURE 6.—Portion of mature cloud spiral, later stage of same storm as shown in figures 2 and 4. TIROS IV, orbital pass 909, April 12, 1962.

confirm the existence of the frontal wave development [4, 5, 6] as one of the sequences leading to a cloud spiral. However, Rogers [3, 7] has shown that another development sequence begins with a characteristic cloud pattern associated with a short-wave trough in the mid-troposphere. The relative role of these two development sequences is a subject of current research.

REFERENCES

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